

1. A method for the physical vapor deposition (PVD) of dielectric material onto a substrate, said method comprising:

- (a) forming an energized monochromatic ion beam;
- (b) converting said ion beam into an energized monochromatic beam of neutrals;
- (c) directing said beam of neutrals toward a sputtering target;
- (d) exposing said target to bombardment by said beam of neutrals;
- (e) sputtering particles from said target;
- (f) forming a cloud of said sputtered particles proximate to a substrate; and
- (g) depositing said sputtered particles onto said substrate.

2. The method as recited in claim 1 wherein said target comprises low-k dielectric material.

3. The method as recited in claim 2 wherein said low-k dielectric material is organic.

4. The method as recited in claim 2 wherein said low-k dielectric material is inorganic.

5. The method as recited in claim 1 wherein said low-k dielectric material has a dielectric constant of about 1.3 to 3.7.

6. A system for the physical vapor deposition (PVD) of dielectric material onto a substrate, said system comprising:

- (a) a sputtering target;
- (b) a low energy, large aperture ion source of energized monochromatic ions;
- (c) an ion optics system for equalizing, shaping, and directing said ions into an ion beam;

- (d) a charge transfer system for neutralization of said ion beam into a beam of neutrals;
- (e) means for directing said beam of neutrals toward the target, said beam of neutrals bombarding said target and causing said target to emit sputtered particles;
- (f) means for forming a cloud of said sputtered particles proximate said substrate; and
- (g) means for depositing said cloud of said sputtered particles onto said substrate.

7. The system as recited in claim 5, wherein said target comprises low-k dielectric material.

8. The system as recited in claim 6 wherein said low-k dielectric material is organic.

9. The system as recited in claim 6 wherein said low-k dielectric material is inorganic.